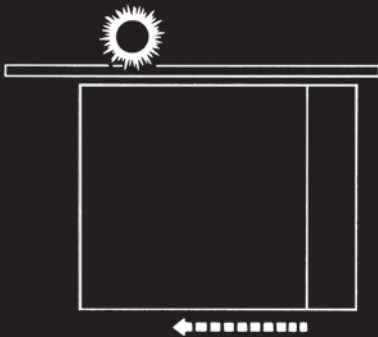




C R O W N  
I N D U S T R I A L  
O P E R A T O R S

Read  
This  
FIRST



**GENERAL  
INSTALLATION,  
OPERATION,  
MAINTENANCE,  
and PARTS MANUAL  
for your**

**Aut-o-dor**

**405DC-EC  
SLIDE DOOR  
OPERATOR**

Copyright © Crown Industrial Operators 2011

**Crown Industrial Operators**  
(Formerly manufactured by Richards-Wilcox)  
213 Michelle Court  
So. San Francisco, CA 94080  
Phone (650) 952-5150  
Fax (650) 873-1495  
website: [www.crown-industrial.com](http://www.crown-industrial.com)

**G-2001**

## CONTENTS

PARAGRAPH		PAGE
1	INTRODUCTION .....	1
	A Purpose .....	1
	B Models Covered .....	1
	C Application .....	1
	D Description .....	1
2	INSTALLATION AND OPERATION .....	1
	A General .....	1
	B Installation of Track Hardware, Door & Operator .....	2
	C Installation of Roller Chain .....	2
	D Wiring Operator .....	2
	E Motor Rotation .....	2 & 3
	F Preliminary Rotary Limit Switch Adjustment .....	3 & 4
	G Vent Plug .....	4
	H Setting The Clutch .....	4
	I Setting Run Speed and Creep Speed .....	4
	J DC Drive Settings .....	5
	K Final Rotary Limit Switch Adjustment .....	6
	L Final Adjustments and Checks .....	6
3	MAINTENANCE .....	6
	A General .....	6
	B Lubrication .....	6
	C Preventative maintenance .....	6
4	PARTS .....	6
	A To Order Replacement Parts .....	6
	WARRANTY .....	7

Note: We reserve the right to modify or change, without prior notice, any statements or information contained herein. If exact dimensions or specifications are required by the customer certified prints will be furnished without charge upon request to Crown Industrial. This manual covers standard catalogued operators only and does not cover special non-standard equipment.

## 1. GENERAL INTRODUCTION

**A. PURPOSE:** This Crown Installation, Operation, Maintenance and Parts Manual has been developed to assist you in the installation, operation and maintenance of your electric operator and thus enable you to utilize it to its maximum efficiency.

**B. MODELS COVERED:** The manual covers the 405DC-EC Operator in production and contains the latest information available. The Model 405DC-EC uses our Standard Duty Electric Clutch. This operator is used for powering single sliding or bi-parting doors. The parts pages have been prepared so you can easily determine the parts contained in your operator.

**C. APPLICATION:** The Model 405DC-EC electric operator offers security as well as the quiet, smooth, and precise movement of the door(s). The ramp-up and ramp-down speed functionality helps to control the overall speed of the door in the final seconds of the opening and closing cycles. Furthermore, in the event of power failure, the electric clutch shall disconnect the doors from the drive train, allowing the doors to be operated manually. To prevent manual operation a magnetic lock with a battery backup can be added to the system.

### D. DESCRIPTION:

(1) **GENERAL:** The Model 405DC-EC operator consists of a permanent magnet DC motor (1/2 or 1 H.P.), a right angle gear reducer, an adjustable electric clutch, and a fully automatic rotary limit switch all assembled into a complete power drive unit assembly.

(2) **TRACK HARDWARE:** The 405DC-MC operator is designed to work with Crown Industrial's #25 enclosed Box Track constructed of #9 Ga. steel with 5/8" round

cold steel bar runways. The track is rigidly fixed to the supporting structure by direct attachment through the use of steel brackets. The load of the entire door(s) is carried on rugged heavy duty Crown #25 four wheel ball bearing trucks. These trucks are driven by roller chain that operates inside the #25 Box Track. Any chain slack that accumulates over time can be taken up by Crown's Chain Tensioner assembly that is directly integrated with the roller drive chain. In addition, for openings over 8'-0" wide, sag rollers are furnished to prevent chain sagging. Also included as an end idler assembly for single sliding applications and a center idler assembly for bi-parting applications.

(3) **DC SPEED CONTROLLER:** Another feature of the Model 405DC-EC electric slide door operator is its adjustable DC speed controller. This controller converts single phase AC line power to regulated DC for adjustable speed control of the permanent magnet DC motor. This allows the operator's acceleration, deceleration, run speed, and creep speed at the ends of each the opening and closing cycles to be field adjustable. By having control over these four features, the durability and dependability of the operator and hardware improves dramatically.

### Features:

- (a) Adjustable operating speed: 45 ft./min. or 60 ft./min. (Dependent on Application and Opening Width).
- (b) Adjustable creep speed.
- (c) Adjustable Acceleration.
- (d) Adjustable Deceleration.
- (e) Electric Clutch.

## 2. INSTALLATION AND OPERATION

### A. GENERAL

The Crown Industrial 405DC-MC Electric Door Operator is rugged, well designed, and dependable. To ensure correct installation and proper operation of the operator and associated hardware, the following instructions are given:

(1) **SHIPMENT CHECK:** To insure that all equipment is complete, check the components received with the material specifications sheets included with the installation packet supplied with the door.

(2) **REVIEW THE INSTALLATION DRAWINGS:** The installation drawings show the layout of the door(s), template drilling for the door(s) and wall,

hardware layouts, and general terms used to describe components. Review the drawings to familiarize yourself with the equipment. To determine the handing of a single slide door operator for mounting purposes, stand on the door side of the wall, facing through the door opening. If the door slides to your right, it is a right-hand slide door, if it slides to the left, it is a left hand slide door

(Refer to Figure 1). Mount operator and sliding door hardware accordingly.

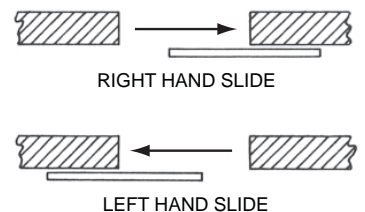


Figure 1. Single Slide Door

## B. INSTALLATION OF TRACK HARDWARE, DOOR & ELECTRIC OPERATOR

(1) Install the #25 track support brackets ensuring they are level and straight.

**Note:** For through the wall applications, drill the hole for the through the wall drive shaft assembly prior to mounting the track support brackets.

(2) Install #25 track ensuring level and straight. Weld all joints of the #25 track using Crown's #25-X374 welding jig.

(3) Install Chain Guide Track above #25 Track.

(4) For bi-parting applications install Center Idler assembly.

(5) Install #25 four wheel ball bearing trucks in track. Attach the Trolley/Chain Connector Link to the top of the lead truck.

(6) Install door(s). Ensure doors hang plumb and true. Confirm the doors slide properly.

(6) Install the Model 405DC-MC electric operator.

## C. INSTALLATION OF ROLLER CHAIN

(1) Disengage the operator by pulling and holding open the release arm at the mechanical disconnect. This will allow the door(s) and operator output shaft to move freely.

(2) Move the door(s) to the full closed position.

(3) Connect one end of a length of roller chain to the lead side of the Trolley/Chain Connector Link. Run this length of roller chain up around the end idler (center idler for biparting applications), then down the Chain Guide Track. Attach the roller chain to the lead end of the Chain Tensioner assembly. **Note:** The Chain Tensioner assembly should be resting in the Chain Guide Track at a point farthest from the opening.

**Warning:** During the opening operation there should be a sufficient amount of roller chain for the Chain Tensioner assembly to travel towards the opening but never to reach the idler. If the Chain Tensioner assembly attempts to go around the end idler (center idler for bi-parting applications) it will damage the assembly.

(3a.) For applications where the opening is larger than 8'-0" wide, Sag Rollers at 5'-0" centers will already be integrated into the roller chain. The roller chain with the first sag roller located 5'-0" from the end, is the length of roller chain that should be connected to the lead end of

the Trolley/Chain Connector Link. Install only the side of the roller chain with the sag roller located in 5'-0" from the end to the Trolley/Chain Connector Link.

(4) Attach the second length of roller chain to the trailing side of the Trolley/Chain Connector Link. Run this length of roller chain down the #25 box track, up around the end idler until you reach the Chain Tensioner assembly.

(5) Remove additional slack from the roller chain then cut to length and attach the cut roller chain to the end of the trailing side of the Chain Tensioner assembly. Further, adjust the Chain Tensioner assembly to minimize slack in the chain.

(5) Manually slide the door(s) to the full open and back to the full closed positions several times, checking that the Chain Tensioner stops short of contacting the end idlers. Confirm the doors slide freely. If the doors are difficult to move, the tension in the chain may be too tight and should be corrected at the Chain Tensioner assembly.

**Caution: Excessive chain tightness could cause extreme wear on the idler sprockets, shortening life. Conversely, a loose chain could jump the drive sprocket and jamb or change door stopping points.**

## D. WIRING OPERATOR

(1) 405DC-MC electric door operator is intended for applications where motor branch circuits with voltage and current characteristics meet operator ratings. Branch circuit, branch circuit disconnecting means and branch circuit overcurrent protection are to be properly sized in respect to the operator horsepower rating.

**WARNING: Ensure operator branch circuit is disconnected from power source when installing, adjusting, or servicing operator.**

(2) Wire operator and control circuit as shown on the wiring diagram in the packing list envelope. Be sure all power is off.

## E. MOTOR ROTATION

(1) Ensure the mechanical disconnect at the operator is still disengaged. See part C. Installation of Roller Chain part #2.

(2) Determine if the system controls are set up as Momentary or Constant pressure.

*Constant Pressure:* Each time the actuator is depressed the operator is energized. The operator will run only when the actuator is held in the depressed position.

*Momentary.* When the actuator is depressed the operator shall start up and continue to operate until the appropriate limit switch is activated or a STOP button is depressed.

IF MOMENTARY CONTROLS ARE USED CONSULT FACTORY BEFORE PROCEEDING.

*Step 1:*

With the mechanical disconnect disengaged and the door free to move by hand, turn the power ON. Depress "Open" push button. Does the Relay in the control box labeled "O" light? If YES, proceed to step (2), if NO, TURN POWER OFF and check the wiring from the "OPEN" activation switch to the control box.

*Step 2:*

Is the operator rotating the proper direction to open the door? If NO, turn off power to the operator control box. Switch the motor wires typically labeled M1 & M2 or A1 & A2, located at the bottom of the control box. Turn the power back on and check for proper rotation.

## F. PRELIMINARY ROTARY LIMIT SWITCH ADJUSTMENT

(1) DESCRIPTION: The rotary limit switch is designed to accurately control the end limits of the door travel provided by the electric operator as well as the activation point and duration of the creep mode. The limit switch input shaft drives a set of planetary gears which in turn drives a set of nylon cams (See Figure 2). Each precision limit switch unit is actuated by its individual nylon cam. The cam rotate as the operator travels the door back and forth. The cam contact the electrical snap switches to either stop the travel of the operator or initiate the creep modes. The limit switch has 4 switches.

- (a) LSO = Limit Switch Open  
This limit shuts off the electric operator when the door reaches the full open position.
- (b) LSC = Limit Switch Close  
This limit shuts off the operator when the door has reaches the full closed position.
- (c) LSCO = Limit Switch Creep Open  
This limit activates the creep mode during the end of open cycle. When the limit switch is actuated the door travels in the open direction at a reduced speed.
- (d) LSCC = Limit Switch Creep Close  
This limit activates the creep mode during the closing cycle. When this limit switch is actuated the door travels in the closed direction at a reduced speed.

To adjust each individual limit switch, turn the screw adjustment for each specific limit switch. Note that depending upon the handing of the operator the cams

travel from either the clockwise or counterclockwise direction to activate the appropriate snap switches.

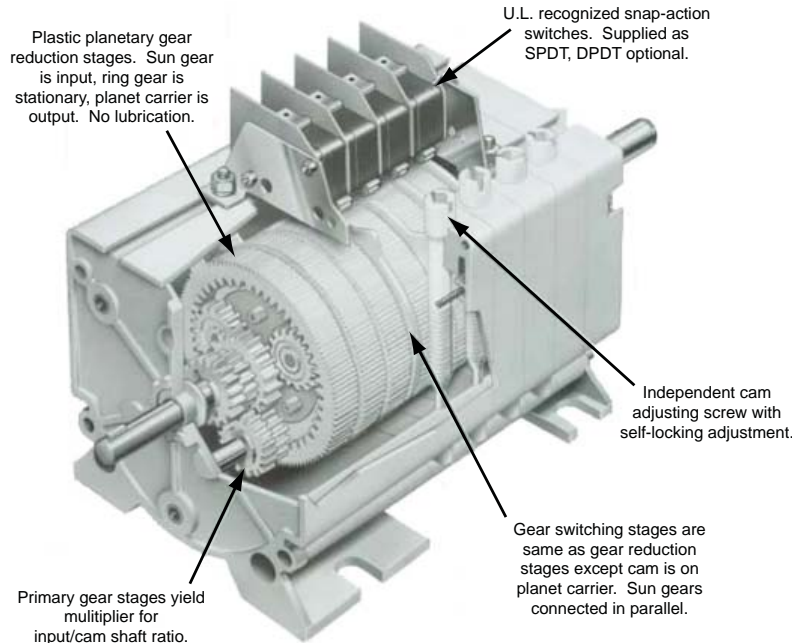
(2) PREPARATION FOR ADJUSTMENT:

- (a) **Disconnect the Electrical Power Supply to the Operator Control Box.**
- (b) Unscrew limit switch cover and expose assembly.

(3) ROUGH ADJUSTMENT:

- (a) Manually slide the door in the open direction and note the direction the LSO cam lobe is traveling. Clockwise or counterclockwise?
- (b) Manually slide the door to approximately 6" from the full open position.
- (c) Adjust the LSO cam adjuster until the cam contacts the electrical snap switch from the same direction and you hear it click.
- (d) Manually slide the door towards the closed direction and back towards the open direction. The snap switch should click when the door gets approx. 6" from the full open position.
- (e) Position the door approx. 12" from the full open position.
- (f) Turn the LSCO cam adjusting screw until the cam contacts the electrical snap switch from the same direction as the LSO switch and you hear it click. **Note:** This cam is longer and the operator shall only travel in closed creep mode while this cam is depressing the snap switch.
- (g) Repeat Step (d). The LSCO the snap switch should click when the door gets approx. 12" from the full open position.
- (h) Manually slide the door to approximately 6" from the full closed position.
- (i) Turn the LSC cam adjusting screw until the cam contacts the electrical snap switch from the opposite direction and you hear it click.
- (j) Manually slide the door towards the open direction and back towards the closed direction. The snap switch should click when the door gets approx. 6" from the full closed position.
- (k) Position the door approx. 12" from the fully closed position.
- (l) Turn the LSCO cam adjusting screw until the cam contacts the electrical snap switch from the same direction as the LSC switch and you hear it click. **Note:** This cam is longer and the operator shall only travel in open creep mode while the cam is depressing the snap switch.
- (m) Repeat step (j) LSCO the snap switch should click when the door gets approx. 12" from the full open position.
- (n) Move the door back and forth noting that the proper snap switches are being contacted from the proper direction at the proper time.

**Rotary Cam Limit  
Switch Assembly  
Figure 2.**



**SRLS51-( $\frac{17.5}{29}$ )-SP4**

**G. VENT PLUG**

Remove the 1/2" NPT steel pipe plug located nearest the top of the gearbox and replace it with the plastic vent plug provided with the operator (See Figure 16).

**H. SETTING THE CLUTCH**

(1) The purpose of the clutch is to protect the equipment from shock loads that might be introduced into the system. Under normal operation the clutch will not slip. Therefore, the clutch should be adjusted to a sufficient torque that will allow the operator to start and stop the door without any slipping. Keep in mind also that the clutch should not be so tight that it cannot slip under excessive loads.

(2) The magnetic clutch has an adjustable torque output feature. The output is controlled by rotating the electronic clutch controller located in the main control panel. When the voltage is reduced the clutch torque characteristics are de-rated. The clutch should be set with just enough power to move the door. Turning off the power to the operator will power off the clutch controller and will allow the door to be operated manually. As an additional option, a magnetic lock with battery backup can be used to prevent manual operation of the door during power failure.

**I. SETTING RUN SPEED AND CREEP SPEED**

Inside the operator control box locate the run speed and creep speed potentiometers (Figure 4). The potentiometers control the run and creep speeds of the operator. Turning them clockwise increases the rate of travel.

- (a) Carefully turn the run speed potentiometer all the way counterclockwise and then back clockwise approx. 135 degrees.
- (b) Carefully turn the creep speed potentiometer all the way counterclockwise and then back clockwise approx. 20 degrees.
- (c) Release the drive chain latch and affix it so that it cannot reattach automatically. Note the location of the long link, this is where the chain latch attaches to the drive chain.
- (d) Turn ON the power to the operator controller.
- (e) Actuate a push button to run the operator. The operator should travel the door in the appropriate direction, slow down and creep into approximately the full open or closed position.
- (f) Reconnect chain latch to long link. Operate the door open and closed.
- (g) To increase or decrease the travel speed in both run and creep speed adjust the appropriate potentiometer clockwise to increase the speed and counterclockwise to decrease the speed.
- (h) Set the run and creep speeds to the desired levels.

## J. DC DRIVE SETTINGS

### (1) ACCEL/DECEL

The DC drive located inside the operator control box has separate potentiometers for both ACCEL and DECEL. These are typically set at the factory but are field adjustable. Depending upon the size and weight of a specific door, it may be necessary to field adjust the ACCEL & DECEL to allow for the operator to smoothly

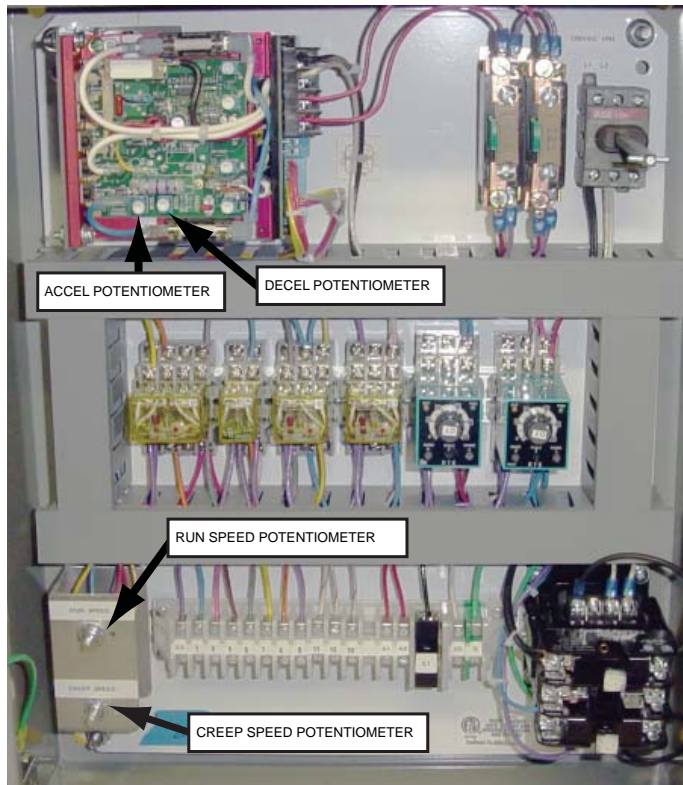


Figure 4.

ramp up to full run speed and smoothly ramp down to creep speed (See Figure 4, 5 & 6).

The ACCEL potentiometer controls the acceleration from 0 to the run speed setting. **The minimum ACCEL setting should be 1 second.**

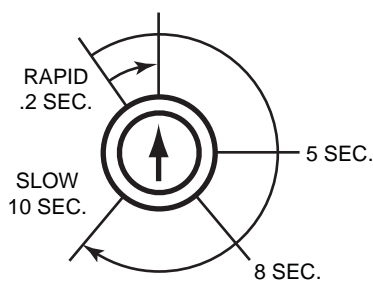
The DECEL potentiometer controls the deceleration rate

The following procedure, presented in order of adjustment sequence, should be used when re-adjusting all trimpot functions:

#### CAUTION!

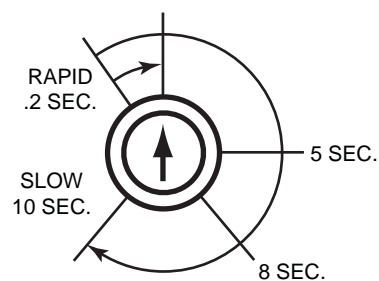
[PM motors only]. Adjusting the accel time below .5 seconds increases inrush current. It may be necessary to measure the peak inrush current and consult with motor manufacturer since field magnet demagnetization may occur.

FACTORY SETTING 1 SEC.



ACCEL

FACTORY SETTING 1 SEC.



DECEL

Figure 6.

from run speed to creep speed.

To adjust either the ACCEL or DECEL, turn the potentiometer clockwise to increase the duration of time to accelerate or decelerate, and counterclockwise to decrease the time. The setting must take into account the run speed, weight of the door and the length of the creep mode. The faster the travel and/or the heavier the door the longer the transition time should be.

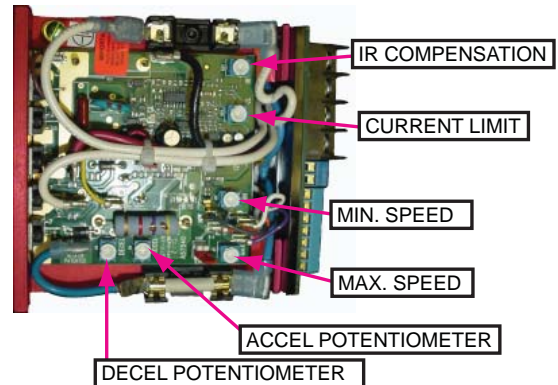


Figure 5.

**DO NOT ATTEMPT TO ADJUST THE OTHER POTENTIOMETERS ON THE DC CONTROL BOARD. THEY ARE FACTORY SET & ADJUSTMENTS WILL DAMAGE THE UNIT AND VOID THE WARRANTY.**

(2) MAXIMUM SPEED - factory set, do not adjust without consulting factory

(3) MINIMUM SPEED - factory set, do not adjust without consulting factory

(4) CURRENT LIMIT - factory set, do not adjust without consulting factory

(5) IR COMPENSATION - factory set, do not adjust without consulting factory

### K. FINAL ROTARY LIMIT SWITCH ADJUSTMENT

After the run speed, creep speed and ACCEL & DECEL have been adjusted, the final limit switch settings can be made.

- (a) Actuate the operator controls and adjust the rotary limit switches (LSO & LSC) to stop the door in the full open and closed positions.
- (b) Actuate the operator and adjust the rotary limit switches (LSCO & LSCC) to initiate the creep mode at the desired time. Keep in mind that the operator only travels in creep mode as long as the cam lobe is depressing the snap switch.

**Note:** The length of time the operator is running in creep mode must be long enough to allow for it to dynamically brake from run speed to creep speed plus the desired length of time the operator is traveling under creep mode. If the DECEL time is set for too long, the creep mode may be adversely affected.

- (c) After adjusting LSCO & LSCC check the travel of the door. LSC & LSO may need to be re-adjusted.
- (d) Activate the operator to open and close the door several times and fine tune the limit switch settings.
- (e) Close limit switch cover and tighten down screw clamp.
- (f) Periodically the limit switches may require adjustment. This is especially evident during the initial few weeks after start up due to chain stretch and wear in.

### L. FINAL ADJUSTMENTS & CHECKS

(1) Make a final check of operator, Chain Tensioner, sliding door hardware, sag roller(s) and idlers. It is extremely important that the operator be run several times to check chain alignment. Make corrections as needed.

## 3. MAINTENANCE

### A. GENERAL

To insure that the electric operator is ready for operation at all times, it must be inspected systematically which will preclude serious damage or failure. Proper adjustment and lubrication must be maintained and checked as recommended below.

### B. LUBRICATION

#### (1) LUBRICATION FOR GEARMOTOR

(a) Figure 16 shows the proper location of vent, oil level, and drain plugs.

(b) The drive unit is pre-lubricated and shipped with Mobil "SHC 634" synthetic lubricant. This oil is a lifetime lubricant rated for operation in ambient temperatures ranging from -40°F to +125°F.

(2) Every 900 cycles, where one cycle consists of opening and closing of the door, or every 3 months whichever comes first, clean and lubricate the chain with a SAE lubricant as required for ambient temperature.

### C. PREVENTIVE MAINTENANCE

To prevent damage or improper operation, the following inspections should be let made at least EVERY 6

#### MONTHS.

- (1) Check oil level by removing the oil level plug. Oil should be up to the bottom of the plug hole.
- (2) Check tension of chain.
- (3) Check all electrical components and wiring for tightness.
- (4) Check clutch to see that it doesn't slip under normal operation.
- (5) Check all bolts and nuts for tightness.

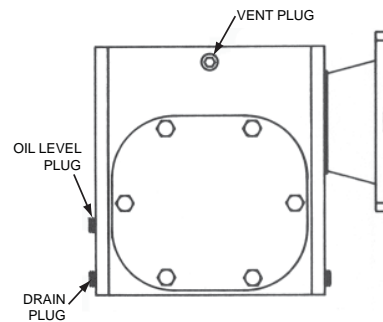


Figure 7.

## 4. PARTS

### A. TO ORDER REPLACEMENT PARTS

- (1) SEND IN SERIAL NUMBER OF ELECTRIC OPERATOR.
- (2) SPECIFY the number of pieces needed.
- (3) Order by part number and name of part.
- (4) State whether to ship by freight, truck, parcel post, or air express.
- (5) State whether transportation charges are to be prepaid or collect.
- (6) Give name and address of the person or company to whom the parts are to be shipped.
- (7) Give name and address of person or company to whom the invoices to be sent.



# MAINTENANCE INFORMATION

(To Be Filled Out By User)

Operator Serial Number \_\_\_\_\_ H.P. \_\_\_\_\_

Supplied on Crown Industrial Operators Order Number \_\_\_\_\_

Power Supply \_\_\_\_\_ Volts \_\_\_\_\_ Hz \_\_\_\_\_ Phase \_\_\_\_\_

Installed At \_\_\_\_\_ Date \_\_\_\_\_

Notes \_\_\_\_\_

---

---

---

---

## GUARANTEE

If, within a period of one year from date of shipment, any part of a CIO Electric "Aut-o-doR" Operator is found defective due to poor materials or workmanship, new parts will be furnished free of charge F.O.B. manufacturer's plant, providing the equipment has been given normal and proper usage, lubrication, and maintenance and is still the property of the original purchaser and/or part of the original installation. *THIS WARRANTY IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND THE MANUFACTURER MAKES NO IMPLIED WARRANTY OF MERCHANTABILITY BEYOND THE EXPRESSED TERMS HEREOF. MANUFACTURER'S LIABILITY FOR DAMAGES, INCLUDING CONSEQUENTIAL DAMAGES RESULTING FROM ANY SUCH DEFECTIVE PRODUCT IS STRICTLY LIMITED TO THE DELIVERY OF NEW PARTS, AS SET FORTH ABOVE.*



### Crown Industrial Operators

213 Michelle Court

So. San Francisco, CA 94080

Phone (650) 952-5150

Fax (650) 873-1495

website: [www.crown-industrial.com](http://www.crown-industrial.com)

## G-2001

Crown Industrial Operators • 213 Michelle Ct. • So. San Francisco, Ca 94080-6202

Phone: (650) 952-5150 • Fax: (650) 873-1495

[www.crown-industrial.com](http://www.crown-industrial.com) Email: [autodor@crown-industrial.com](mailto:autodor@crown-industrial.com)